University of California, Berkeley
Department of Electrical Engineering and Computer Sciences
EE123: DIGITAL SIGNAL PROCESSING

Fall 2006

Discussion #9

1. Overlap-add

2. Overlap-save

3. Two finite-length sequences $x_1[n]$ and $x_2[n]$, which are zero outside of the interval $0<=n<=99$ are circularly convolved to form a new sequence $y[n]$. If $x_1[n]$ is nonzero only for $10<=n<=39$, determine the set of values of n for which $y[n]$ is guaranteed to be identical to the linear convolution of $x_1[n]$ and $x_2[n]$.

4. Consider two finite-length sequences $x[n]$ and $h[n]$ for which $x[n]=0$ outside the interval $0<=n<=49$ and $h[n]=0$ outside the interval $0<=n<=9$.
    a. What is the maximum possible number of nonzero values in the linear convolution of $x[n]$ and $h[n]$?
    b. Let $y[n]$ be the 50-point circular convolution of $x[n]$ and $h[n]$, and we know that $y[n]=10$ for $0<=n<=49$. Furthermore, the first 5 points of the linear convolution of $x[n]$ and $h[n]$, $z[n]$, is 5 (i.e. $z[n]=5$ for $0<=n<=4$). Determine as many points as possible of $z[n]$.